

# **C** **CLIMATE PROTECTION REPORT**

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**MEASURES TO REDUCE GREENHOUSE GAS EMISSIONS**



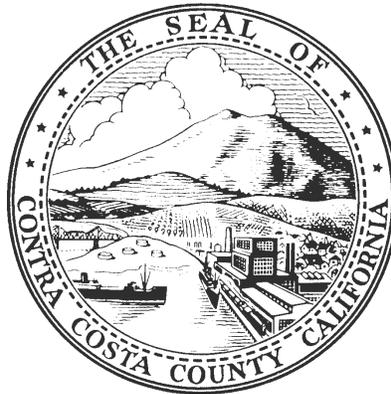
**CONTRA COSTA COUNTY**  
*NOVEMBER 2005*

This Climate Protection Report outlining measures taken by the County and some other local governments to reduce greenhouse gas (GHG) emissions was prepared for the:

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This report was prepared by staff designated by the County's Climate Change Working Group (comprised of Department Heads of the Community Development Department, General Services Department, Health Services Department and Public Works Department). The County Board of Supervisors formed the Climate Change Working Group in May 2005 and directed that the Working Group begin work on a model ordinance identifying best practices to reduce greenhouse gas emissions in August 2005.

Staff developed this report based on research of Climate Action Plans and related ordinances prepared by local governments, which lists the measures they selected to mitigate their local sources of GHG emissions and are within their authority at the city or county level. Although there are many measures listed in this report, they only represent a fraction of the measures taken by cities and counties throughout the United States. It is likely that more measures could be identified with input from other knowledgeable sources, including additional County staff from Departments which have authority over other potential local sources of emissions such as buildings (Building Inspection) and agriculture (Agriculture) as well as experts in the field of GHG emissions.

All relevant measures known to staff that the County has already either partially or fully implemented are listed in this report. Those measures which have not been implemented by the County or could be expanded upon are identified with the subheading "**Additional action(s) to be considered (may be dependent on additional funding)**". Additional research and analysis should be conducted to determine feasibility and effectiveness of certain measures, due to their complexity.

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# INTRODUCTION

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## SOURCES OF GHG EMISSIONS

Federal, state and local governments have conducted inventories of greenhouse gas (GHG) emissions to gain an understanding of the sources of the emissions as well as track changes over time. After conducting an inventory of GHG emissions, municipalities can target their efforts to address the most significant sources and effectively reduce their overall emissions.

Table 1 summarizes the sources of GHG emissions within the State, Bay Area and several local municipalities.

*Table 1. Sources of GHG Emissions*

Source	California	BAAQMD	SF	Marin Co.	Berkeley
Transportation	41.2%	59%	51%	50%	45%
Industrial *	22.8%	12%	10%	4%	6%
Electric Power	19.6%	26%	N/A	N/A	N/A
Agriculture & Forestry	8.0%	N/A	N/A	6%	N/A
Residential & Commercial **	8.4%	N/A	39%	40%	49%

\* industrial percentages includes waste sector if separately identified (e.g. Marin)

\*\* residential & commercial percentages includes energy usage by municipal sector

These local governments have conducted GHG emission inventories, based on energy and waste data, to calculate greenhouse gas emissions for a base year and for a forecast year. The inventory and the forecast capture emissions from all municipal operations (e.g. county owned and/or operated buildings, street lights, transit systems, wastewater treatment facilities) and from all community-related activities (e.g. residential and commercial buildings, motor vehicles, waste streams, industry). The inventory and forecast provide a benchmark against which the municipality can measure progress. The GHG inventory is the first of five milestones in the Cities for Climate Protection methodology which is described in more detail in Appendix B.

This report was prepared without any data regarding local sources of GHG emissions (usually identified through a GHG inventory) and therefore staff was unable to quantify the relative impact that the measures have had or could have on the County's overall GHG emissions.

## TYPES OF GHG EMISSIONS

There are four main types of greenhouse gases (GHGs): carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and high global warming potential (GWP) gases. Table 2 summarizes the composition of GHG emissions by type of gas at both the state and national level.

Carbon dioxide (CO<sub>2</sub>) is released into the atmosphere primarily as a result of the burning of fossil fuels (oil, natural gas and coal) for power generation and in transportation. It is also emitted through various industrial processes, forest clearing, natural gas flaring and burning of organic matter. Some carbon is sequestered (captured/stored) in vegetation and agricultural soils which keeps it from collecting in the atmosphere.<sup>1</sup> Consumption of fossil energy accounts for about 80% of human caused CO<sub>2</sub> emissions and land disturbance accounts for most of the remaining 20%.<sup>2</sup>

Methane (CH<sub>4</sub>) is produced primarily as a result of the decomposition of organic wastes in municipal solid waste landfills and from agricultural and biological processes related to wetland rice cultivation, livestock digestion and waste. Methane's overall contribution to global warming is significant because it is estimated to be more than 20 times as effective at trapping heat in the atmosphere as CO<sub>2</sub>.<sup>1</sup>

Nitrous oxide (N<sub>2</sub>O) is naturally produced in soils from microbial processes. Additions of nitrogen to soils by the agricultural sector increases the amount of N<sub>2</sub>O emitted. Nitrous oxide is also emitted during industrial production activities, solid waste combustion and fossil fuel combustion. Nitrous oxide is approximately 300 times more powerful than CO<sub>2</sub> at trapping heat in the atmosphere.<sup>1</sup>

High GWP gases include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF<sub>6</sub>). HFCs are primarily used as replacements for ozone-depleting substances, such as chlorofluorocarbons (CFCs). PFCs and SF<sub>6</sub> are emitted by a variety of industrial processes including aluminum smelting, electric power transmission and distribution, magnesium processing and semiconductor manufacturing.<sup>1</sup>

*Table 2. GHG Composition by Type of Gas*

<b>Area (Year)</b>	<b>CO<sub>2</sub></b>	<b>CH<sub>4</sub></b>	<b>N<sub>2</sub>O</b>	<b>GWP</b>
United States (2002)	84.5%	7.9%	5.5%	2%
United States (1998)	81.4%	9.9%	6.5%	2.2%
California (2002)	83.3%	6.4%	6.8%	3.5%
California (1998)	87%	11%	2%	N/A

# MEASURES TO REDUCE INTERNAL GHG EMISSIONS

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This chapter includes measures that have been partially or fully implemented by the County to reduce GHG emissions generated directly as a result of County operations (including County owned or maintained buildings, vehicles and right-of-way). Those measures which have not been implemented by the County or could be expanded upon are identified under the subheading **“Additional action(s) to be considered (may be dependent on additional funding)”**. Additional research and analysis should be conducted to determine feasibility and effectiveness of certain measures, due to their complexity.

## COUNTY BUILDINGS

Buildings contribute to GHG emissions due to energy consumption. GHG emissions from buildings have increased by almost 2% per year in the United States since 1990.<sup>3</sup> Based on energy usage, heating (space and water), air conditioning and lighting offer the most significant opportunities to reduce GHG emissions from buildings.

In recent years, the Board of Supervisors has adopted several progressive policies and plans regarding the design, operation and maintenance of County buildings. In December 2000 the Board directed staff to initiate a process to develop principles, policies, and design guidelines for sustainable County buildings. In March 2001 the Board adopted the Energy Reduction Action Plan to reduce energy use at County facilities. In February 2004 the Board adopted the Strategic Energy Plan to implement strategies that will provide the County with a proactive and comprehensive energy management program.

1. **Use sustainable design and construction techniques in new buildings and remodeling projects**
    - a. Require consulting architects and engineers to utilize the County’s “Building Design and Construction Guidelines” which specify the use of CHPS (Collaborative for High Performance Schools) strategies for sustainable design and construction, to the extent applicable and feasible. The CHPS strategies encompass most of a building’s systems, including site planning, furnishings, lighting, day lighting/fenestration, building enclosure/insulation, and heating, ventilation and air conditioning (HVAC). The CHPS strategies are described in the CHPS “Best Practices Manual, Volume 2”.
    - b. Implement a structural Integrated Pest Management (IPM) program for County buildings. Since July 2003, the County has implemented structural IPM in approximately 30 locations. Each new building placed under the IPM umbrella results in the reduction of hundreds or even thousands of gallons of pesticides dispensed and paid for by the County.
- Additional action(s) to be considered (may be dependent on additional funding):**
- c. Review/revise building design and construction standards on an ongoing basis, as new information, building practices, technologies and codes emerge.

- d. Expand the structural IPM program. The goal is to expand the County’s structural IPM program by 10 new locations per year.
- e. Require consulting architects and engineers to implement a minimum number of sustainable design and construction strategies for each County building project (new buildings and remodeling projects). Alameda County has taken the extra step of adopting and implementing a Green Building Ordinance for County Buildings.

**2. Design new buildings so energy efficiency exceeds State code requirements**

- a. Require consulting architects and engineers to design energy usage in new County buildings to be at least 10% below California’s Title 24 code requirements.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Further increase the energy efficiency construction standards (e.g. 15% below California’s Title 24 code requirements).

**3. Improve energy efficiency of heating, ventilation and air conditioning (HVAC) systems**

- a. Install direct digital control (DDC) system for heating, ventilation and air conditioning (HVAC) systems in major facilities and all new and remodeled buildings. A DDC system uses a centralized computer to adjust HVAC, as needed, to help maximize operational efficiency and reduce energy consumption.
- b. Improve, retrofit and replace HVAC systems in selected buildings. Improvements include specialized tests (retro-commissioning) and adjustments (calibration) to return HVAC systems in selected buildings to designed operation. Certain less efficient HVAC equipment is replaced ahead of schedule, when warranted based on life-cycle analysis.

***Additional action(s) to be considered (may be dependent on additional funding):***

- c. Expand HVAC improvement and retrofit program to additional County buildings.

**4. Improve energy efficiency of indoor lighting systems**

- a. Install state-of-the-art lighting technology and systems in selected County facilities. Light-emitting diode (LED) Exit Signs are being installed in County buildings, which is one example of energy efficient lighting technology. Continue examining improvements to stairway lighting that could reduce energy consumption.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Expand lighting retrofit program to additional County buildings.
- c. Expand lighting program to integrate control of lighting systems with the direct digital control system (as described above related to HVAC systems) to optimize efficiency and include daylight harvesting technologies. Daylight harvesting involves using sunlight whenever possible instead of artificial lighting in buildings.

**5. Install additional energy efficiency technologies in buildings**

- a. Install variable frequency motor drive technology in selected buildings. This energy efficient technology can control the speed of motors used in pumps, fans, conveyors, air compressors and chillers.

- b. Install vending misers on vending machines. A vending miser turns off the lights and compressor in the vending machine during periods of inactivity (no motion around the vending machine). Vending misers have been installed in all appropriate County facilities.

***Additional action(s) to be considered (may be dependent on additional funding):***

- c. Install variable frequency motor drive technology in additional County buildings.
- d. Test promising emerging technologies that can reduce energy demand and use.

## **6. Perform energy assessments on facilities**

- a. Perform energy assessments on major County facilities.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Expand energy assessment and best practices program to additional County facilities.

## **7. Install cogeneration plants to reduce use of natural gas**

- a. Design/install cogeneration plant for the Martinez Detention Facility. This cogeneration plant will use heat generated by an engine to help heat the boilers, which will reduce the amount of natural gas used.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Install cogeneration plants for the other County facilities that operate 24-hours per day (e.g. West County Detention Facility).

## **8. Use renewable power**

- a. Install photovoltaic (PV) solar panels on rooftops of certain County facilities. PV solar panels have been installed at two County facilities in Martinez (Martinez Detention Facility on Pine Street and an office building located at 50 Douglas Drive).

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Evaluate additional renewable power projects.

## **9. Install district heating and cooling plants**

***Additional action(s) to be considered (may be dependent on additional funding):***

Examine potential of district heating and cooling for County facilities in downtown Martinez. District heating and cooling refers to use of a centralized heating and cooling plant, consisting of boilers, chillers and piping, to provide heating and cooling to multiple buildings.

## **10. Use cool roofing systems for buildings**

- a. Use cool roofing systems in accordance with Title 24 for new County buildings and when re-roofing existing County buildings. Cool roofing systems help reduce the “urban heat island” effect. Urban areas can be 5°-10° F warmer than surrounding non-urban areas and are therefore referred to as “urban heat islands”.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Explore opportunities to expand use of cool roofing systems.

**11. Install shading improvements on buildings**

***Additional action(s) to be considered (may be dependent on additional funding):***

Install more shading improvements on County buildings, such as window shades and awnings (use of trees to help shade buildings is discussed in the next section entitled “County Right-of-Way & Outdoor Infrastructure”).

**12. Retrofit existing buildings with insulation and thermally resistant window film**

- a. Install thermally resistant window films on selected County facilities.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Expand installation of thermally resistant window film to additional buildings.
- c. Retrofit existing inefficient buildings with insulation.

**13. Participate in energy demand response programs**

- a. Participate in energy demand response programs in selected County facilities to reduce electric use during critical periods.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Expand energy demand response participation to more County facilities.
- c. Install real-time power metering to develop power demand limiting capability.

**14. Incorporate efficiency and sustainability criteria when selecting sites for new buildings and leases**

***Additional action(s) to be considered (may be dependent on additional funding):***

Develop efficiency and sustainability criteria to be used in the selection process for new leases and building sites. Master planning process for capital projects should identify opportunities to optimize site and facility utilization, reduce energy consumption and maximize resource efficiency. In many instances, the selection of the site is the single most important decision affecting the sustainability of a building.

**15. Use commissioning agents for new building projects**

***Additional action(s) to be considered (may be dependent on additional funding):***

Hire commissioning agents for new construction projects. Commissioning, a systematic quality-assurance process that increases the likelihood of a building meeting County standards, has been shown to result in lower utility bills. Commissioning helps ensure that: the various systems in a building are designed to work interactively together in an efficient and effective manner, the building is built so that the systems function and interact as designed and the building functions properly after it is built and occupied.

**16. Consider potential climate impacts and life-cycle cost analysis prior to investment in capital facilities**

***Additional action(s) to be considered (may be dependent on additional funding):***

Reevaluate the concept of “payback”. The typical life-cycle cost analysis is usually restricted to actual “dollars and cents”, without regard to the true cost a decision may have on the climate or environment. The true cost of a decision includes its impact on factors including but not limited to: depletion of non-renewable resources, pollution, degradation of the value of important common resources, damage to vital ecosystem services (such as oxygen production, protection from ultraviolet radiation, flood control).

## **COUNTY RIGHT-OF-WAY & OUTDOOR INFRASTRUCTURE**

The County is responsible for establishing standards for and maintaining various outdoor features including street lighting and signals, landscaping and roads. There are many opportunities to minimize GHG emissions from these sources, many of which the County has already implemented or are in the process of implementing.

**17. Use LEDs in traffic signals**

Use light emitting diodes (LEDs) in all traffic signals to reduce energy consumption. The County has upgraded to LEDs in 100% of all traffic signals (signal lights, prepare-to-stop signs, flashers, school flashers, microprocessor controllers) in the unincorporated areas. In addition to the unincorporated areas, the County has contracts to maintain the traffic signals for 13 cities in the County. LEDs have been installed in a total of 70-80% of all traffic signals maintained by the County (in the incorporated and unincorporated areas combined).

**18. Use LEDs in pedestrian signals, street lights and lighted street name signs**

a. Use LEDs in pedestrian signals (walk & don't walk signs). LEDs have been installed in approximately 25% of the pedestrian signals in the unincorporated areas.

***Additional action(s) to be considered (may be dependent on additional funding):***

b. Install LEDs in the remaining 75% of pedestrian signals (walk & don't walk signs) in the unincorporated areas.

c. Switch out existing less efficient street lighting and lighted street name signs with LEDs. Technology is moving in the direction of LED for many uses including street lights because they greatly reduce energy consumption.

d. Install parking lot lighting control and efficiency improvements.

**19. Use solar energy to power outdoor lighting**

a. Use solar energy in certain locations to energize flashers and retain excess power in storage batteries. Solar power has been used in a limited amount of apparatus, such as warning flashers, in remote areas of the County. To date they have not been totally reliable thus using this type of a power source on a more widespread basis, such as signals, is not recommended at this time.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Identify additional opportunities to use solar powered outdoor lighting as this technology advances.

**20. Reduce pavement widths for roads**

- a. Use the minimum amount of pavement necessary to afford the needed safety and durability. Reduced pavement widths help minimize resource consumption (raw materials in pavement as well as energy used to extract, manufacture, transport, install and maintain the paving materials) and related costs. The County is currently exploring reduced pavement widths to minimize storm water runoff from developed areas, while considering emergency response needs as well as pedestrian and bicycle safety.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Incorporate appropriate traffic calming features (including reduced pavement widths) into road maintenance standards to help enhance bicycle and pedestrian safety on existing roads.
- c. Identify potential regional, state or federal funding that could be used to purchase and install appropriate bicycle and pedestrian amenities for future road improvement projects.

**21. Explore alternative paving materials and techniques**

- a. Explore alternative paving techniques, such as reduced pavement thickness. Reduced pavement thicknesses, like reduced pavement widths, help minimize resource consumption and related costs. Using thicker road base material or other longer wearing pavement surfaces would allow the required thicknesses to be reduced. The County has standards that require a certain thickness and density of pavement based on the type of road (collector, arterial, rural road, etc.), the volume of traffic intended to use the road and the soil type under the proposed road. New products are continuously being introduced to stabilize the base rock materials which in turn require a reduced asphalt thickness.
- b. Test alternative paving materials. The County's Pavement Management Program is constantly looking at alternative pavement products and the Road Maintenance Program tests them in sections in the County. County has utilized some rubberized pavement made of recycled tires mixed in with a reduced thickness of asphalt which is supposed to have a longer life and require less maintenance. Some large developers in the County are also testing alternative paving materials and techniques in large tracts in an effort to minimize the pavement thickness, as it is one of the largest costs to their infrastructure requirements. It may take some time to fully test new materials for acceptable use, as the County's experience has shown with SierraCrete in East County.

**22. Explore the use of cool paving materials when repairing/resurfacing parking lots**

***Additional action(s) to be considered (may be dependent on additional funding):***

Explore the use of cool paving materials when repairing/resurfacing parking lots. Dark colored pavements can get up to 40° F hotter than the surrounding air which contributes significantly to the “urban heat island” effect. Lighter-colored materials have higher solar reflectance, so they absorb less of the sun's energy and stay cooler. Permeable, or porous, pavements allow water to filter into the ground, keeping the pavement cool when moist. Permeable pavements can be constructed from a number of materials including porous concrete (blended), asphalt and plastic lattice structures filled with soil, gravel and grass. Use of permeable paving materials would also compliment efforts to comply with new requirements to minimize and manage storm water runoff from developed areas.

**23. Minimize use of concrete and limit use to blended concrete**

***Additional action(s) to be considered (may be dependent on additional funding):***

Use as little concrete as possible and only use porous blended concrete. Blended concrete (e.g. portland and flyash cement) uses less raw concrete which is important because cement processing and production is responsible for 50% of the nation's industrial GHG emissions. Porous blended concrete is a cool paving material which helps reduce the “urban heat island” effect.

**24. Replace unnecessary pavement in existing parks and playgrounds with landscaping or permeable surfaces**

***Additional action(s) to be considered (may be dependent on additional funding):***

- a. Revise the County Code to reflect the new Regional Water Quality Control Board (RWQCB) regulations and C.3 provisions. These new C.3 requirements have driven the County's Clean Water Program to re-examine the way storm water is handled. Although not specifically intended, there is a very parallel benefit to climate control from the types of measures identified in the “Stormwater C.3 Guidebook”. Many of the County's ordinances must be updated and changed to comply with the C.3 regulations. In doing this, there are tremendous opportunities to further climate protection efforts.
- b. Identify what sections of pavement in County owned parks and playgrounds are no longer necessary. These areas can then be de-paved as funding and resources allow.

**25. Use water conserving landscaping and irrigation systems**

Require that landscaping and irrigation used on County maintained land meets or exceeds the requirements of the County's “Water Conservation Landscaping in New Developments Ordinance” #90-59 (Chapter 82-26 of the County Code).

**26. Plant trees and other landscaping in existing medians and parking lots**

***Additional action(s) to be considered (may be dependent on additional funding):***

- a. Establish program to systematically plant trees in existing medians while maintaining the structural integrity of the pavement. Additional plantings in medians and other County right-of-way is possible, but currently these plantings are only associated with new development in a formed maintenance district area. Planting trees helps sequester carbon which reduces the accumulation of GHG emissions in the atmosphere. See tree planting and maintenance program discussion below regarding related funding issues.
- b. Provide adequate shade trees in existing County owned/maintained parking lots to reduce the “urban heat island” effect. Urban areas can be 5°-10° F warmer than surrounding non-urban areas and are therefore referred to as “urban heat islands”.
- c. Re-examine the County’s landscape standards to determine the best types of vegetation to use in specific areas. An overall increase in trees is possible for increased shading; although native tree species need less water, irrigation issues would need to be addressed.

**27. Establish tree planting and maintenance program for County owned and/or maintained land**

- a. Maintain existing trees located on County owned and/or maintained land. Tree maintenance in public spaces within the County is only done in areas where there is a defined entity to provide financing. There is no countywide tree maintenance program, unless the tree is a safety hazard.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Plant shade trees on the east and west sides of County buildings, to maximize the benefit derived from the shade that the trees provide. Trees help sequester carbon and when planted near buildings they provide shading and act as a wind break. By helping protect the building and surrounding landscaping from sun and wind, trees will reduce energy consumption (air conditioning during the summer and heating during the winter), reduce water consumption for existing landscaping (plants are more shaded and there is less drying caused by wind) and reduce consumption of materials by prolonging the useful life of existing building features (reduced damage to building window sill areas, reduced sun damage to siding, carpets, drapes and furniture). Planting additional trees will require additional funding, not only for the purchase, installation and irrigation, but also for long term maintenance (pruning and fertilizing) to keep the tree in healthy condition. However, it is also important to note that planting trees can offer a relatively short payback period on the investment due to the cost savings related to reduced energy/water use, less frequent replacement of certain building contents (carpets, drapes and furniture), reduced need for repairs (window sill areas) and other maintenance by cutting down the dust and dirt entering a building.

## **28. Use natural vegetation and landscaping around paved surfaces**

### ***Additional action(s) to be considered (may be dependent on additional funding):***

Use natural vegetation and landscaping around paved surfaces, where appropriate, to help act as a filter for storm water runoff, without sacrificing the structural integrity of the pavement. This would also compliment efforts to comply with new C.3 regulations to minimize and manage storm water runoff. The County's "Stormwater C.3 Guidebook" is a self-help manual for developers and staff to assist in complying with the new regulations. The guidebook is a series of best management practices (BMPs) designed to meet the goals. The initial handbook identified many mechanical BMPs and since has been updated to move towards using vegetation and landscape based measures to accomplish the goals. More undeveloped area will be needed in new development projects to comply with these requirements, thus producing less impervious surfaces and increasing the amount of landscaping. Examples of some C.3 BMPs which also help protect the climate include:

- Use landscape strips and planter areas to essentially "filter" storm water before it enters the public storm drain system.
- Use permeable pavements in non-high traffic areas, such as parking lots.
- Use depressed parking medians in parking lots so the water flows to them and then into a collection system.
- Increase in overall vegetation to handle the quantity of water, which would also help protect climate.

## **COUNTY FLEET**

Vehicle emissions account for a majority of the GHG emissions. CO<sub>2</sub> accounts for over 80% of the GHG emissions and over 78% of the nation's CO<sub>2</sub> is generated by vehicles (62%) and heavy trucks (17%).<sup>4</sup> According to a recent report, the vehicle miles traveled in California is growing 1.89% per year.<sup>5</sup>

The Board of Supervisors adopted a policy in August 2000 which required at least 10% of all County vehicle purchases to be zero emission vehicles (ZEV). The County had purchased three Toyota Rav4's which were ZEVs, they only worked in limited situations due to the relatively short range each vehicle could travel in spite of fully charged batteries (batteries would develop a memory and the range each vehicle could travel with fully charged batteries would continually decline over time). Toyota Motor Company disbanded the Rav4 electric vehicle program and subsequently the County had to turn in all three of the Rav4 electric vehicles. The Board of Supervisors adopted the Low Emission Vehicle and Fleet Policy in September 2004, which supersedes the ZEV policy. The Low Emission Vehicle (LEV) and Fleet Policy requires the County to purchase low emission vehicles for a portion of its fleet.

## **29. Purchase electric vehicles**

Purchase electric fleet vehicles to eliminate the constant starting and stopping of combustion engine vehicles. The County currently has 20 neighborhood electric vehicles (NEVs) in the fleet. NEVs are similar to golf carts and are primarily used for grounds maintenance purposes or trips within large complexes.

**30. Purchase hybrid vehicles**

- a. Purchase hybrid (gasoline and electric) fleet vehicles to increase overall fuel efficiency. Hybrids produce less air pollutants as compared to a comparable class vehicle that runs on petroleum fuel only. The County fleet currently has 67 hybrid vehicles.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Add more hybrid vehicles to the fleet.

**31. Purchase compressed natural gas vehicles**

- a. Purchase compressed natural gas (CNG) fleet vehicles. CNG vehicles are considered zero emission vehicles and expanding the use of this fuel will reduce climate change. The County fleet currently has 34 CNG fleet vehicles.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Add more CNG vehicles to the fleet.

**32. Install fueling stations/infrastructure for alternative fueled vehicles**

- a. Install fueling stations/infrastructure for electric and CNG fleet vehicles. The County recently installed a “fast fill” CNG fueling facility, in addition to the existing electric and CNG fueling stations installed in designated County parking areas.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Determine if additional fueling stations or infrastructure will be needed to support the expansion of alternative fueled vehicles in the County fleet.

**33. Install diesel particulate traps on heavy-duty vehicles**

***Additional action(s) to be considered (may be dependent on additional funding):***

Retrofit heavy-duty vehicles with particulate traps to reduce diesel emissions. The County has recently applied to the Bay Area Air Quality Management District for grant funds (\$262,500) to retrofit some of the County’s heavy-duty vehicles with particulate traps. The County currently uses super ultra low sulfur fuel for diesel, consistent with Board policy.

**34. Minimize purchase of sport utility vehicles**

Limit the purchase of sports utility vehicles for the County fleet to only those cases which are justified based upon work assignments, consistent with the Board’s LEV and Fleet Policy.

**35. Capture evacuated vehicle air conditioning freon & refrigerant**

Utilize vehicle refrigerant units that capture evacuated air conditioning freon and refrigerant so that it is not expelled into the atmosphere and can be reused when needed. It is a completely sealed system of recovery and installation. The removal of large equipment refrigerant is done by contractors, however General Services Department staff removes refrigerant from smaller units and stores the refrigerant until enough has been accumulated for proper disposal.

## COUNTY PROCUREMENT

GHGs are emitted throughout every product's life-cycle (meaning the production, transport, use and disposal). Decreasing the supply and demand of materials and products helps protect the climate in two ways:

- reduces GHG emissions associated with the energy used during extraction, manufacture, transportation and disposal, and
- increases capture/storage of carbon (known as sequestration) in trees/vegetation and undisturbed soil.<sup>6</sup>

Cement is a drastic example of the significance that an increase in demand for a specific material can have on GHG emissions. Some 10.7 million metric tons of greenhouse gases were released in 1998 as a by-product of cement production in the U.S., an increase of 18% since 1990.<sup>7</sup> Cement processing and production accounts for 50% of the nation's industrial GHG emissions.

### 36. **Print businesses cards on recycled-content paper**

- a. Require that all business cards for County employees be printed on recycled-content paper. Many of the County's business cards are printed on recycled paper since the Board policy was adopted in September 1990.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Adopt new Administrative Bulletin directing all County departments to print business cards on recycled-content paper. Administrative Bulletins are easily accessed by County departments directly over the intranet which should help ensure consistent implementation of this policy countywide.

### 37. **Purchase recycled-content office supplies**

- a. Purchase recycled-content toner cartridges. Since the implementation of the County office supply contract in March 2004, the majority of County departments have been purchasing recycled toner cartridges, which has resulted in savings of approximately \$30,000 and reduced the amount of new cartridges manufactured for County use.
- b. Purchase recycled-content office paper. The County office supply contract offers both non-recycled and recycled-content paper, however County departments have the option of selecting either paper type. Review of six months of data regarding departments' purchases from the County's office supply vendor showed that 70% of the paper purchases were for non-recycled paper and 30% were for recycled, an approximate 2 to 1 ratio. If the County switched to using only recycled paper for an entire year (based on existing volumes purchased), it could reduce GHG emissions by 270 metric tons of carbon annually. This would be equivalent to taking over 58 cars off the road for a year.

***Additional action(s) to be considered (may be dependent on additional funding):***

- c. Replace as many of the office supplies on the County's core list with acceptable recycled-content equivalents as possible.
- d. Equalize prices for recycled vs. non-recycled supplies on the County's core list during the bid and negotiations processes for future office supply contracts. The

County is charged \$0.24 less for each ream of non-recycled paper compared to the recycled paper through the County's current office supply vendor.

**38. Purchase recycled-content office furniture**

***Additional action(s) to be considered (may be dependent on additional funding):***

Purchase office furniture that contains recycled-content. Most office furniture on the market today contains recycled content; the County could consider furniture selection based upon sustainability (including recycled content). To implement this, the County would need to develop a standard list of product specifications.

**39. Purchase high efficiency motors, appliances and equipment**

***Additional action(s) to be considered (may be dependent on additional funding):***

Use high efficiency motors, appliances, and equipment (including computers) in all facilities. The County considers energy efficiency, cost and other factors when making purchasing decisions; however, there is currently no official mandate that only the highest efficiency product be purchased.

**40. Purchase recycled-content carpeting**

Use only recycled-content carpeting in new buildings or when remodeling. The County has specified the use of recycled-content carpet in all of its buildings for over 10 years. The carpet types specified contain a minimum of 50% post-consumer content.

**41. Require bids for building materials to include pricing for environmental specifications**

***Additional action(s) to be considered (may be dependent on additional funding):***

Require future building material bids to include pricing for environmental alternatives. County building material contracts are bid annually. These bids could be sent out with regular specification and environmental and sustainability specifications (recycled-content, locally recyclable, durable, less toxic, resource efficient) to be bid as an alternate. Then based upon the pricing received the County could make a decision to buy the sustainable materials if they are less expensive or within a specified range.

**42. Require contractors to include environmental specifications in bids for new County buildings**

a. Require contractors and vendors to provide products made from recycled and recyclable materials, where such products exist. The County is currently requiring this, where economically feasible.

***Additional action(s) to be considered (may be dependent on additional funding):***

b. Expand requirements for future bids to include additional environmental specifications (such as building materials' recyclability, durability, efficiency, toxicity/indoor air quality, etc.)

**43. Adopt and enforce environmental purchasing ordinance**

***Additional action(s) to be considered (may be dependent on additional funding):***

Develop an environmental/sustainable purchasing policy. By adopting a sustainable purchasing ordinance, the County could clearly identify which products should be used, whether to allow for a price preference or identify any other consideration regarding the climate that should be incorporated into procurement decisions.

**COUNTY WASTE (REUSE & RECYCLING)**

The amount of GHG emissions reduced as a result of the paper, scrap metal and computers recycled by the County's General Services Department in 2004 is roughly equivalent to taking 1,745 cars off the road for an entire year. This only represents the GHG reductions resulting from some of the materials recycled from County buildings. Furthermore, it does not account for reuse through the Surplus Program, annual public yard sale or internet auction website.

**44. Reuse and recycle office equipment and furniture**

- a. Conduct ongoing program to facilitate reuse and recycling of office furniture and equipment from County buildings. In 2004, a total of 109 tons of scrap metal and almost 2,000 computer monitors and toner cartridges were recycled through this program. By recycling these items, the County reduced GHG emissions roughly equivalent to taking 1,453 cars off the road for an entire year.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Amend policy (Administrative Bulletin 517) that allows departments to destroy hard drives before sending them to Surplus, rather than erasing ("scrubbing") the data on the hard drives. This Bulletin states that a list of County approved "scrubbing" software is available on the Intranet, however this is not the case. As a result, it has become common practice for departments to destroy hard drives and throw them in the trash; technically, this is the only way departments can comply with the Administrative Bulletin. All of these computers without hard drives are now going to waste because they are no longer being reused by other departments or purchased from the yard sale or internet auction. Reusing computers rather than recycling or disposing of them significantly reduces GHG emissions. Reusing one ton of computers instead of disposing of them is equivalent to taking 14 cars off the road for a year.
- c. Amend policy (Administrative Bulletin 517) to require that Surplus property only be disposed with Board approval after exhausting any local donation (e.g. non-profit organizations) or recycling options. Current policy requires the County to incur costs for the staff time, fuel and disposal fees that could be avoided if the items were donated or recycled.

**45. Reuse and recycle building materials**

- a. Require contractors to recycle construction waste from County building and remodeling projects. When old carpet is removed from County buildings it is returned to the manufacturer for use in the manufacture of future products. The

amount of construction debris required to be reused, recycled or otherwise diverted from disposal depends on the job. Factors that can affect the amount of debris diverted include, but is not limited to, the amount of materials in reusable condition, local recycling facilities or services for each type of debris and level of contamination.

- b. Direct consulting architects and engineers to reuse as much of the existing structures and building materials as possible during remodeling projects.

**46. Print and copy documents using double-sided pages**

- a. Print and copy documents using double-sided pages. Some County departments routinely copy and print documents using double-sided pages, which helps reduce overall paper consumption.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Identify opportunities to increase the amount of double-sided copying and printing. Opportunities range from voluntary to mandatory actions. An example of a voluntary approach would be sending periodic notices to County departments encouraging use of double-sided pages. Examples of mandatory approaches include adopting an Administrative Bulletin requiring employees to print and copy on double-sided pages (except faxes) or changing the specifications for future large copier/printer purchases to assure that they will copy/print on double-sided pages by default and only copy/print single-sided when selected for special needs (such as faxing).

**47. Collect recyclables from County buildings and parks**

- a. Collect and recycle paper from 194 County buildings. In 2004, a total of 343 tons of cardboard and 1,000 tons of mixed paper (includes office paper, colored paper, newspaper and magazines) were recycled through this program, which is equivalent to taking 292 cars off the road for an entire year. This does not include the amount of material recycled from County buildings in West County because they are collected and processed by the local private hauler.
- b. Collect and recycle beverage containers (aluminum cans, glass bottles and plastic bottles) from approximately 26 County buildings and 7 County parks. In 2004, a total of 3.8 tons of bottles and cans were recycled through this program.

***Additional action(s) to be considered (may be dependent on additional funding):***

- c. Expand the recycling collection program for beverage containers (aluminum cans, glass bottles and plastic bottles) to serve more County buildings, as funding allows.
- d. Establish notification system to inform County Recycling Program staff of all office location changes. County offices periodically move around, close permanently, close temporarily during remodeling, temporary offices are established and sometimes new units are established. As a result, from time to time buildings without paper recycling service are identified. The General Services Department is not aware of any County offices that do not currently have paper recycling service.

**48. Recycle municipal landscaping debris**

Divert municipal landscaping debris for beneficial use. Most of the landscaping debris from County parks or buildings is reused (e.g. grasscycling, using a mulching mower

regularly and leaving the grass clippings in place for a healthier lawn) or collected by the local recycling hauler. The County uses mulch in certain landscape areas to help retain water and keep the soil healthy.

## COUNTY EMPLOYEE VEHICLE TRIPS

The measures listed below help reduce GHG emissions by reducing the amount of vehicle miles traveled per County employee. These measures also offer other benefits including, reducing traffic congestion, maximizing the use of the existing roadway system and reducing non-GHG emissions. Employees that leave their cars at home just one day a week can reduce CO<sub>2</sub> emissions by 795 pounds per year.<sup>8</sup>

### 49. Encourage eligible employees to telecommute

- a. Allow employees to telecommute (work from home or alternate work site). Telecommuting reduces vehicular emissions by eliminating vehicle trips. The Board of Supervisors approved the County's Telecommuting Program in 1993.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Encourage all County departments to periodically remind employees about the County's Telecommuting Program.
- c. Identify potential opportunities to increase the number of employees that participate in the Telecommuting Program (e.g. availability of laptop computers for telecommuting use).

### 50. Provide financial incentives to employees participating in a vanpool

- a. Offer financial incentives (including subsidies) for employees participating in a vanpool. Since 2003, County employees that sign up for a vanpool through Enterprise Rideshare, qualify for 25% off monthly vanpool costs.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Secure additional funding to continue 25% vanpool subsidy. The subsidy program is presently limited to a single funding source which can not be renewed after it is expended.

### 51. Provide financial incentives to employees using mass transit

- a. Offer financial incentives to employees for using transit or forming a new carpool. The County offers these financial incentives to employees through "511 Contra Costa", a comprehensive transportation demand management program, which promotes alternatives to the single occupant vehicle.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Allow employees to use pre-tax dollars to pay for mass-transit or carpool expenses (e.g. commuter checks).

**52. Encourage flex schedules and compressed work weeks**

- a. Allow employees to have flex schedules or compressed work weeks. If employees work on flex schedules and therefore avoid peak traffic periods, their trips will be shorter with less idle time and thereby reduce vehicular emissions. Employees can reduce even more vehicular emissions using compressed work weeks because it eliminates an entire two-way trip once every one or two weeks. The compressed work weeks offer additional benefits including reduced energy costs since the entire office is closed (lights and computers off). Some County departments have instituted compressed work weeks (e.g. Community Development and Building Inspection have 9/80 schedules, Public Works has a 4/10 schedule).

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Increase the number of County departments that institute compressed work weeks. To maximize energy efficiency, department-wide compressed work week schedules should be implemented (entire office closed one or two days every two weeks) whenever possible. However, departments that need to remain open every weekday should implement alternating compressed work week schedules (half of the employees are off on designated weekdays on alternating weeks).

**53. Require employees to use trip-appropriate vehicles**

- a. Limit purchase of large vehicles. The LEV and Fleet Policy adopted by the Board in September 2004 directs that the purchase of sports utility vehicles for the County fleet be limited to only those cases which are justified based upon work assignments (e.g. off-road use).

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Establish policy that the most efficient vehicle possible be selected for each staff trip, based on the number of passengers, weight of cargo and likelihood of off-road use. Smaller cars produce fewer emissions per trip or mile, therefore vehicles used for County business should default to a compact size car unless a larger size vehicle is absolutely required for the particular job.

**54. Adopt Smart Drive procedures for staff trips**

***Additional action(s) to be considered (may be dependent on additional funding):***

Adopt Smart Drive procedures that direct staff to link vehicular trips whenever possible, carpool to meetings, accelerate more slowly and reduce idling. This would result in greater fuel-efficiency and lower emissions. Successful Smart Drive programs can also result in net savings because of lower fuel costs.

**55. Provide free preferred parking for employees that carpool**

- a. Provide free preferred parking for employees' vehicles used for carpooling. The County offers preferred employee carpool parking at the County Administration Building complex in downtown Martinez.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Provide free preferred carpool parking for employees at additional County facilities (similar to employee of the month parking spaces).

**56. Provide bicycle parking for employees**

- a. Provide bicycle lockers and/or racks at work sites to encourage employees to bike to work. The County has installed bicycle lockers at the County Administration Building complex in downtown Martinez. Additionally, the Board adopted a Countywide Bicycle Action Plan which includes goals and objectives to increase bicycle use within the County.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Provide bicycle lockers and/or racks for employees at additional County facilities.

**57. Provide shower facilities for employees**

- a. Provide shower facilities at work sites to encourage employees to bike, walk or run to work. There are shower facilities for men and women at the Public Works Department's offices in Martinez and showers for men in the basement of the County Administration Building in downtown Martinez.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Provide shower facilities for women in or near the County Administration Building in downtown Martinez.
- c. Provide shower facilities for employees at additional County facilities.

# MEASURES TO REDUCE EXTERNAL GHG EMISSIONS

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This chapter includes measures that have been partially or fully implemented by the County to reduce GHG emissions generated by the private sector. Those measures which could be expanded upon or have not been implemented by the County (and potentially fall within the County's authority) are identified under the subheading "***Additional action(s) to be considered (may be dependent on additional funding)***". Additional research and analysis should be conducted to determine feasibility and effectiveness of certain measures, due to their complexity.

## LAND USE

Land use plans and regulations that reduce the distance between housing, employment and community services help protect the climate by reducing vehicle miles traveled and related consumption of fossil fuels. Additionally, land use decisions that improve pedestrian and bicycle access or create a balance of jobs and housing in the same vicinity can significantly reduce commute distances.

### **58. Establish urban growth boundaries**

Establish urban growth boundaries to help reduce sprawl and promote compact development. Measure C was approved by the voters in 1990 which established the County's 65/35 Land Preservation Plan requiring at least 65% of the land be preserved for non-urban uses (parks, open space, etc.). The County has also adopted an Urban Limit Line (ULL) which limits future development to areas within the established boundary. Voters approved Measure J in 2004 which requires jurisdictions to place their ULL before the voters in order to qualify for a portion of the return-to-source funds generated by the extension of the ½ sales tax for transportation improvements.

### **59. Incorporate climate protection goals and policies into the General Plan**

***Additional action(s) to be considered (may be dependent on additional funding):***

Incorporate climate protection goals, policies and implementation measures into the Conservation Element during the County's next General Plan update.

### **60. Incorporate Smart Growth principles and concepts into the General Plan**

***Additional action(s) to be considered (may be dependent on additional funding):***

Incorporate specific Smart Growth principals and concepts during the County's next General Plan update. Smart Growth promotes the clustering of development and covers many land use issues some of which are identified separately in this report, such as urban growth boundaries and mixed use development. A specific example of a Smart Growth concept that could be incorporated into the County's General Plan is to decrease the minimum lot size from 6,000 square feet to encourage higher density development.

**61. Provide density bonuses for affordable housing projects**

- a. Provide density bonuses for affordable housing projects. The County offers density bonuses for development projects that include specified number of affordable housing units as mandated by State law.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Increase the amount of density allowed in designated unincorporated areas by changing the minimum lot size requirements specified in the General Plan.

**62. Encourage mixed use development**

- a. Encourage mixed use development which will limit some travel distances. Some portions of the unincorporated area are zoned to allow mixed use development.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Rezone certain portions of the unincorporated area to allow more mixed use development.

**63. Analyze potential climate impacts prior to making recommendations regarding approval or denial of development projects**

***Additional action(s) to be considered (may be dependent on additional funding):***

Revise County’s California Environmental Quality Act (CEQA) Guidelines to help staff identify each proposed project’s potential impact on the climate. A similar approach has been discussed at the State level, if approved it would not be necessary at the local level.

## **PRIVATE SECTOR BUILDINGS**

The CO<sub>2</sub> emissions from residential and commercial buildings are expected to increase nationally at a rate of 1.4% annually through 2025.<sup>3</sup> Many of the measures identified in this section are similar to measures listed in the section entitled “County Buildings” in the previous chapter.

**64. Offer weatherization program to help existing buildings maximize energy efficiency**

- a. Offer weatherization program to help existing buildings maximize energy efficiency. The County offers a weatherization program, which is federally and state funded, for the purpose of assisting low and/or fixed income households in making their homes more energy efficient. Applicants that meet the income guidelines and submit applications qualify for an on-site assessment and weatherization improvements. These improvements can include repair or replacement of gas furnaces, stoves or water heaters; plug gaskets; weather-stripping of exterior doors and if necessary replacement of exterior doors; replacement of broken windows; installation of ceiling insulation; programmable thermostats; water saving devices or carbon monoxide alarm. The federal weatherization program estimates that each household that participates will save an average of \$218 a year and release 0.25 metric tons less carbon annually.<sup>3</sup>

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Expand weatherization program to offer additional energy efficiency improvements if adequate funding becomes available.

**65. Adopt wood burning ordinance**

- a. Adopt a wood burning ordinance to establish standards for fireplaces and other wood burning appliances. The Board of Supervisors adopted the “Wood Burning Appliances Ordinance” # 2000-35 (added as Chapter 718-10 in the County Code) in November 2000 to regulate new construction or replacement of wood burning appliances in the unincorporated area of the County.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Determine whether further reduction of GHG emissions would be achieved by adopting more stringent standards for wood burning appliances or completely banning them.

**66. Require re-roofing projects to use cool roofing materials**

***Additional action(s) to be considered (may be dependent on additional funding):***

Explore adoption of a cool roofing ordinance to require use of certified cool roofing materials or systems for certain re-roofing projects, either because of their location (appropriate climate zone) or design.

**67. Require all new buildings to use cool roofing systems**

- a. Use of cool roofing systems is allowed by State law and is one of the ways to help reduce a building’s anticipated energy usage as calculated pursuant to California’s Title 24.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Explore adoption of a cool roofing ordinance to require use of certified cool roofing materials or systems in certain new buildings, either because of their location or design. Cool roofing systems would offer the greatest potential for energy savings in the warmer climate zones, such as zone 12 which covers most of Central and East County.

**68. Adopt energy efficiency standards for all development projects**

***Additional action(s) to be considered (may be dependent on additional funding):***

Explore adoption of an ordinance to require specified energy efficiency for all new buildings. There are many examples of this type of ordinance that have been adopted by other counties or cities.

**69. Require new developments to facilitate use of solar**

***Additional action(s) to be considered (may be dependent on additional funding):***

- a. Identify requirements that should be imposed on new development projects to assure buildings are designed to facilitate use of solar energy for electricity, water heating and/or space heating/cooling.

- b. Determine whether a local ordinance is required to compliment the “Solar Shade Control Act”, California Government Code § 25980 et. seq., to protect solar access. Some local governments in other states adopted solar access ordinances to promote use of renewable energy.

**70. Include renewable energy use standards in local building code**

***Additional action(s) to be considered (may be dependent on additional funding):***

Explore adoption of an ordinance to require use of renewable energy (e.g. solar) for private building projects. For example, the ordinance could require inclusion of solar hot water heaters and/or require that pools be heated using solar heaters or equipped with a solar blanket. Incorporating these measures could also help a project comply with Title 24. Just a solar water heater alone can reduce household CO<sub>2</sub> emissions by 720 pounds a year.<sup>8</sup>

**71. Require that new residential garages have connections to charge electric-powered vehicles**

***Additional action(s) to be considered (may be dependent on additional funding):***

Require installation of appropriate electrical connections in the garage area of all new homes to charge electric vehicles.

**72. Require adequate space for storing and collection of recyclables be provided in all development projects**

***Additional action(s) to be considered (may be dependent on additional funding):***

Adopt ordinance to require all development projects to provide specified amount of space for storing and collecting recyclables. Due to a change in State law effective July 1, 2005 the County is required to enforce the State’s “Model Recycling Space Allocation Ordinance”, in the absence of locally adopted ordinance. Adopting a local ordinance that clearly identifies space standards that meet the requirements of local recycling collection services would help ensure more meaningful and consistent implementation and enforcement.

**73. Adopt green building guidelines and rating/point system**

- a. Adopt standard residential green building guidelines. The Board adopted the County’s Residential Green Building Guidelines and Residential Green Building Program Implementation Plan in June 2005. There are two versions of the Guidelines, one for new home construction and the other for residential remodeling. The use of these Guidelines is completely voluntary.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Adopt Green Building Guidelines for multi-family and/or commercial buildings.
- c. Adopt a green building rating/point system based on the Green Building Guidelines. This system can support voluntary efforts allowing builders to demonstrate the amount of green building features in each building. Furthermore, this system could be used to support a mandatory green building program in the future (e.g. minimum number of points required for each building project).

- d. Utilize third-party green building certification process. There is no system in place at the County to certify a green building; initial research indicates that a rating system using third-party inspectors would be more cost effective than a system using County employees.

## **SITE IMPROVEMENTS (LANDSCAPING, ROADS & LIGHTING)**

Many of the measures identified in this section are similar to or complement the measures listed in the section entitled “County Right-of-Way & Outdoor Infrastructure” in the previous chapter.

### **74. Preserve and increase urban tree canopy**

- a. Require the preservation of trees in urban areas. In 1994, the Board of Supervisors approved the “Tree Protection and Preservation Ordinance” (added as Chapter 816-6 in the County Code) which provides for the preservation of certain trees over a specified diameter throughout the unincorporated area of the County. The County routinely imposes conditions of approval on certain development projects (such as major subdivisions) which include flood control and design requirements related to landscaping. A mature Douglas Fir tree can sequester (trap and hold) from 14.8 to 51.5 metric tons of carbon (diameters of 36” and 60” respectively), which is roughly equivalent to the CO<sub>2</sub> emissions from 0.5 to 1.5 cars annually.<sup>9</sup>

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Amend relevant sections of County Code to protect more urban trees and encourage/require planting of additional trees. Consider incorporating information regarding which tree species are more effective at trapping carbon and do not contribute to emissions.

### **75. Require new developments to plant native trees in medians and common areas**

***Additional action(s) to be considered (may be dependent on additional funding):***

Revise the County’s landscape standards to specify the best types of vegetation to use in specific areas. Consider specifying the minimum number of trees to be planted in each 100 foot segment of medians and each 1,000 square feet of common areas. An overall increase in trees is possible and although native species should require less water, irrigation issues would need to be addressed. Trees take carbon from the atmosphere and store it in their tissues for long periods, this keeps the carbon from accumulating in the atmosphere, trapping heat and causing climate change.

### **76. Require new developments to use drought-tolerant landscaping**

Require new development projects to plant drought-tolerant landscaping. The Board of Supervisors adopted the “Water Conservation Landscaping in New Developments Ordinance” #90-59 (Chapter 82-26 of the County Code) which restricts the use of turf and requires the use of drought-tolerant landscaping in most medium to large development projects in the unincorporated areas.

**77. Require new developments to use water conserving irrigation systems**

Require new development projects to install water conserving irrigation systems. As mentioned above the Board of Supervisors adopted the Water Conserving Landscaping in New Developments Ordinance which includes certain irrigation system requirements and restrictions.

**78. Require new developments to maximize use of landscaping and permeable surfaces**

a. Require new developments to maximize use of landscaping. Many chapters of County Code, including but not limited to Chapter 82-26, 814-2, 814-4, 814-6, 914-4 & 1002-8, have various requirements related to landscaping and trees. The County routinely imposes conditions of approval on certain development projects (such as major subdivisions) which include flood control and design requirements related to landscaping.

***Additional action(s) to be considered (may be dependent on additional funding):***

b. Require new developments to use permeable pavements in place of impervious pavements. Permeable, or porous, pavements allow water to filter into the ground, keeping the pavement cool when moist. Permeable pavements can be constructed from a number of materials including porous concrete (blended), asphalt and plastic lattice structures filled with soil, gravel and grass. Use of permeable paving materials would also compliment efforts to comply with new requirements to minimize and manage storm water runoff from developed areas.

c. Revise the County’s landscape standards to increase the amount of overall landscaping required and specify the best types of vegetation to use in designated areas.

**79. Require use of natural vegetation and landscaping around paved surfaces**

***Additional action(s) to be considered (may be dependent on additional funding):***

Use natural vegetation and landscaping around paved surfaces, where appropriate, to help act as a filter for storm water runoff, without sacrificing the structural integrity of the pavement. This would also compliment efforts to comply with new C.3 regulations to minimize and manage storm water runoff. The County’s “Stormwater C.3 Guidebook” is a self-help manual for developers and staff to assist in complying with the new regulations. The guidebook is a series of best management practices (BMPs) designed to meet the goals. The initial handbook identified many mechanical BMPs and since has been updated to move towards using vegetation and landscape based measures to accomplish the goals. More undeveloped area will be needed in new development projects to comply with these requirements, thus producing less impervious surfaces and increasing the amount of landscaping. Examples of some C.3 BMPs which also help protect the climate include:

- Use landscape strips and planter areas to essentially “filter” storm water before it enters the public storm drain system.
- Use permeable pavements in non-high traffic areas, such as parking lots.
- Use depressed parking medians in parking lots so the water flows to them and then into a collection system.

- Increase in overall vegetation to handle the quantity of water, which would also help protect climate.

**80. Require specified tree shade coverage for all parking lots**

*Additional action(s) to be considered (may be dependent on additional funding):*

Adopt local ordinance to require specified amount of shade coverage for all parking lots. Shading parking lots helps reduce the “urban heat island” effect. Urban areas can be 5°-10° F warmer than surrounding non-urban areas and are therefore referred to as “urban heat islands”. Multiple local jurisdictions in California have adopted shade tree ordinances and these samples are readily available, as is a brief written assessment of their relative merits. It may be appropriate to specify the minimum required shade coverage in the County’s parking standards.

**81. Require that trees surround each single family dwelling or low-rise building in appropriate locations**

*Additional action(s) to be considered (may be dependent on additional funding):*

Require that at least one tree be placed on the west, northwest and east facing sides of each building. This will significantly reduce cooling costs for a typical home or low-rise building during peak summertime demand. Studies in Sacramento and Phoenix have shown that three mature trees around homes cuts annual air conditioning demand by 25 to 40%.

**82. Explore the use of reflective or other cool paving materials in new developments**

*Additional action(s) to be considered (may be dependent on additional funding):*

- Explore incorporating the use of cool paving (lighter-colored and porous) materials into the County’s standards for non-high traffic areas (e.g. parking lots, paths, etc). Dark colored pavements can get up to 40° F hotter than the surrounding air which contributes significantly to the “urban heat island” effect discussed above. Lighter-colored materials have higher solar reflectance, so they absorb less of the sun's energy and stay cooler.
- Require the use of as little concrete as possible and only allow use of porous blended concrete. Blended concrete (e.g. portland and flyash cement) uses less raw concrete which is important because cement processing and production is responsible for 50% of the nation’s industrial greenhouse gas emissions. Porous blended concrete is a cool paving material which helps reduce the “urban heat island” effect.

**83. Require developments to install bicycle and pedestrian amenities**

- Require certain development projects to construct bicycle and pedestrian amenities. The County routinely imposes conditions of approval on certain development projects (such as large subdivisions) which require installation of bicycle parking, covered bicycle racks and pedestrian shelters at new transit stops, on-street bicycle lanes in which parking is prohibited as well as new bike and pedestrian paths linking residential areas to neighborhood commercial areas, parks, schools, convenience retail areas, transit stops and park-and-ride lots. The Board adopted a Countywide

Bicycle Action Plan which includes goals and objectives to increase bicycle use within the County.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Require more development projects to construct bicycle and pedestrian amenities.

**84. Require certain new development projects to install traffic calming features**

***Additional action(s) to be considered (may be dependent on additional funding):***

Require certain new development projects to install traffic calming features without sacrificing emergency response needs. The County is currently developing a Neighborhood Traffic Management Plan which is scheduled to go before the Board in late 2005 or early 2006. This Plan includes traffic calming measures applicable to residential street design standards intended to slow traffic speeds and thus encourage walking and cycling by improving safety for pedestrians and cyclists. This includes measures such as traffic medians, curb extensions, traffic circles, diverters, speed humps and roadway narrowings. Other measures such as closures (diagonal diverters, half closures, full closures and median barriers) reduce cut-through traffic by obstructing traffic movements in one or more directions and thus improve pedestrian and bicycle safety. Even simple measures like crosswalks and reduced speed limits can make a difference.

**85. Require certain development projects to construct a park-and-ride lot**

- a. Require certain large development projects to construct park-and-ride lots. The County routinely imposes conditions of approval on certain development projects (such as large subdivisions) which require installation of a park-and-ride lot within the project area.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Require more development projects to construct park-and-ride lots, especially in areas with traffic congestion.

**86. Require developments to provide designated preferred parking for high-occupancy vehicles and/or alternative fuel vehicles**

***Additional action(s) to be considered (may be dependent on additional funding):***

Require commercial and industrial developments to provide designated parking for high-occupancy vehicles (vans) and/or alternative fuel vehicles (hybrids, electric vehicles, etc.). This parking requirement would help assure that when these developments begin operation their employees and customers will have an incentive to use more climate-friendly transportation.

**87. Require certain development projects to install features to support mass transit**

- a. Require certain large development projects in designated transit areas to install features to support mass transit. The County routinely imposes conditions of approval on certain development projects (such as large subdivisions) which require road system to be designed to provide efficient and convenient bus routing, installation of bus pullouts and transit stops with covered bicycle racks and pedestrian shelters at locations designated by the transit provider, as well as require

the developer to dedicate all rights of way necessary for the ultimate expansion of the transportation and transit network.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Require consultation with transit agencies for each new development project to identify needed amenities and infrastructure for existing and future transit service in the project area.

**88. Require certain development projects to install alternative fuel vehicle infrastructure**

***Additional action(s) to be considered (may be dependent on additional funding):***

Require certain development projects which exceed minimum size and/or are proposed in designated areas to install fueling station and/or appropriate infrastructure in parking areas to support alternative fuel vehicles (e.g. electric vehicles or compressed natural gas vehicles).

**89. Require energy efficient outdoor lighting and signals in all new developments**

***Additional action(s) to be considered (may be dependent on additional funding):***

- a. Revise street lighting standards to require use of LEDs in all new outdoor lighting. The County has certain standards for standard street lighting within new tracts and along streets which must be installed as a part of new development projects in the unincorporated areas. Current standards could be changed to require the energy efficient LEDs at the time of initial installation for all new traffic signals, don't walk signs, street lights and lighted street name signs.
- b. Require use of solar energy to power specific types of outdoor lighting (e.g. flashers). Solar power has been used in a limited amount of apparatus such as warning flashers in remote areas of the County. To date they have not been totally reliable thus using this type of a power source on a more widespread basis such as signals is not contemplated at this time. As technology continues to advance, the feasibility of expanding use of solar powered outdoor lighting should be re-evaluated.

## **WASTE REDUCTION AND RECYCLING**

The waste management hierarchy established by the California Legislature in the Integrated Waste Management Act of 1989 (commonly referred to as AB 939) also happens to reflect the relative level of GHG emissions generated. The strategies in order of superiority are source reduction, reuse, recycling/composting, transformation and then disposal. Source reduction causes the least GHG emissions and disposal causes the most GHG emissions. Therefore, source reduction programs (such as reducing junk mail and buying in bulk instead of single servings) will result in a more significant reduction of GHG emissions than transformation programs (such as burning household waste to generate heat or energy).

Each person that purchases food and other products with reusable or recyclable packaging instead of those in non-recyclable packaging can reduce CO<sub>2</sub> emissions by 230 pounds

annually.<sup>10</sup> The Metro Region of Portland estimated that their recycling efforts in 2002 reduced GHG emissions by about 612,000 metric tons of carbon.<sup>11</sup>

**90. Conduct junk mail reduction campaign**

- a. Inform local residents and business how they can reduce the amount of unwanted mail they receive and how to recycle the rest. The County has joined with many other Bay Area jurisdictions to help fund the “Stop Junk Mail” campaign. Each year, the average American home receives 1.5 trees in their mailbox in the form of junk mail. Eliminating just one ton of junk mail saves 17 trees and reduces GHG emissions equivalent to taking one car off the road for one year.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Expand the “Stop Junk Mail” campaign to include additional local media outlets.

**91. Help businesses reduce their waste**

- a. Help local businesses identify opportunities to reduce their waste. The County has enlisted the help of a consultant and local haulers to identify the largest commercial waste generators in the unincorporated areas to offer these businesses free waste assessments and waste reduction/recycling recommendations and resources.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Expand program to offer waste reduction and recycling assistance to more businesses.

**92. Adopt variable can rates to promote waste reduction and recycling**

- a. Adopt a variable can rate structure for residential accounts. Variable can rates are also referred to as “pay as you throw”, which means that the rates are set based on waste can capacity. The County approved a variable can rate structure in most of unincorporated West County such that the rate for a 64-gallon can is exactly double the price of the standard 32-gallon can. The majority of customers in this area have the 32-gallon service.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Expand the variable can rate structures to the remaining unincorporated areas in Central and East County. The rates for the large solid waste containers (96-gallon) are lowest in unincorporated East County and as a result the majority of customers in this area have the 96-gallon service.

**93. Provide or mandate recycling collection services**

- a. Mandate residential recycling. Curbside recycling is not an optional service, but rather a component of residential solid waste collection services provided to residences located in areas governed under the County’s collection franchise agreements. Recycling reduces the need for energy-intensive resource extraction. Recycling the following materials has the greatest climate benefit (from greatest to least): aluminum cans, paper materials (office paper, phonebooks, textbooks, magazines), steel cans and plastic containers.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Mandate recycling at all multi-family complexes in the unincorporated areas. Recycling all of the newspaper, cardboard, glass and metal from each home reduces CO<sub>2</sub> emissions by 850 pounds annually.<sup>8</sup>
- c. Mandate recycling collection at all commercial locations in the unincorporated areas.

**94. Offer home composting education and resources**

Offer home composting education and resources. Home composting can reduce GHG emissions by eliminating the need to transport the material for processing or disposal, increasing the carbon storage in soils and reducing methane generated by landfills. The County sponsors free workshops to teach residents how to compost their yard debris at home, offers free “Backyard Composting” books to workshop participants, offers discounted home composting bins and instructional home videos.

**95. Provide education and outreach regarding disposal alternatives**

- a. Provide residents and businesses with easily accessible information regarding local alternatives to disposal. The County provides listings and referrals to local facilities and services that reuse and recycle a wide range of materials. By providing access to this information in various ways (by phone, mail and over the internet), residents and businesses have options to meet their needs, whether it be speaking with someone directly or accessing details quickly any time of day or night. The County operates a toll-free Recycling Hotline, which is staffed during office hours, to answer questions or provide referrals related to reuse, recycling, composting, household hazardous waste or disposal. The County in conjunction with local cities and other agencies reprinted the County’s 2005 Reuse & Recycling Guide in the West, Central and East Contra Costa SBC Yellow Pages which is the most extensive distribution of any Contra Costa County Recycling Guide.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Identify additional opportunities and potential funding sources to expand waste reduction and recycling outreach efforts, including but not limited to newsletters , newspaper articles and advertisements.

**96. Encourage use of recycled materials by manufacturers**

Offer assistance to manufacturers that are considering switching to recycled-content materials to make their products. In 1992, the County’s request to become designated as a Recycling Market Development Zone (RMDZ) was approved by the State. If located within one of the State’s Recycling Market Development Zones, eligible manufacturers using recycled materials to create new products potentially qualify for low-interest loans and other assistance. Manufacturing using recycled rather than raw material reduces emissions, for example net carbon emissions are four to five times lower when materials are produced from recycled steel, copper, glass and paper and 40 times lower for aluminum.

**97. Promote proper handling of toxic discards including household chemicals and electronics**

- a. Inform residents regarding the proper methods to manage their unwanted household chemicals and electronics. The County provides referrals and listings for all local facilities known to accept household chemicals and electronics. The County primarily promotes these facilities through the toll-free Recycling Hotline, Reuse & Recycling Guide and website.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Identify additional opportunities and potential funding sources to expand education program(s) regarding toxic discards (e.g. electronics and household chemicals).

**98. Use methane from landfills to generate electricity**

Encourage local landfill operators to recover methane and use it to generate electricity. Landfilling waste generates methane (CH<sub>4</sub>), a greenhouse gas that is more than 20 times as effective at trapping heat in the atmosphere as CO<sub>2</sub>. State law and local air district regulations require landfills to collect and process landfill gases through a gas collection and emission control system. Two of the three operating landfills in Contra Costa County use methane to produce electricity; the third landfill is currently pursuing the development of a landfill gas power plant.

## **AGRICULTURE**

Agricultural practices can contribute to overall greenhouse gas emissions. The primary sources of agricultural GHG emissions are manure and disturbance of soil and vegetation.

**99. Adopt local manure management ordinance**

***Additional action(s) to be considered (may be dependent on additional funding):***

Determine whether a local manure management ordinance would be appropriate and feasible. This ordinance could help reduce methane emissions as well as encourage the capture of agricultural methane to generate heat and/or power.

**100. Increase no-till crop management techniques**

***Additional action(s) to be considered (may be dependent on additional funding):***

Determine whether no-till crop management techniques are being used or could be expanded. Reducing soil disturbance helps retain carbon thereby not releasing it into the atmosphere.

**101. Reduce use of nitrogen fertilizer**

***Additional action(s) to be considered (may be dependent on additional funding):***

Determine the extent of nitrogen fertilizer use in the County and identify opportunities, if any, to reduce its use. Nitrous oxide (N<sub>2</sub>O) is a GHG that is naturally produced in soils from microbial processes. Additions of nitrogen to soils by the agricultural sector increases the amount of N<sub>2</sub>O emitted into the atmosphere.

## **102. Reduce equipment use**

***Additional action(s) to be considered (may be dependent on additional funding):***

Determine whether there are any opportunities to alter cropping systems in the County to reduce equipment use. Reducing equipment use would reduce CO<sub>2</sub> emissions.

## **103. Increase use of agricultural residues for fuel**

***Additional action(s) to be considered (may be dependent on additional funding):***

Determine whether there are any opportunities to increase use of agricultural residues for fuel. Using agricultural residues as fuel could reduce GHG emissions by displacing use of fossil fuel.

# **REGIONAL**

## **Green Business Practices**

### **104. Green Business Program**

The Bay Area Green Business Program educates and certifies businesses of all types for complying with any applicable environmental regulations and for taking specific steps to prevent pollution, conserve energy, water and other materials, and reduce waste. The goal of the program, a partnership of two dozen environmental agencies and cities in the County, is to “green” as many businesses as possible, showing all businesses in Contra Costa that it is totally possible to be green themselves. Over 200 businesses in Contra Costa have been certified, and almost 600 have been certified in the Bay Area.

## **Drought & Water Conservation**

### **105. Water Conservation & Drought Preparation Education**

- a. The County has already adopted ordinances applicable to local development projects which require the use of water conserving landscaping and irrigation systems as well as encourage the installation of dual water systems to facilitate the use of recycled water for irrigation.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. Work with other agencies (e.g. sanitary districts, water districts, cities, etc.) to maximize use of drought-tolerant landscaping and recycled-water for irrigation. There is likely a wide range of information already developed by these and other agencies which the County can help promote and/or distribute locally.

## **Habitat Conservation Plan**

### **106. East Contra Costa County Habitat Conservation Plan**

- a. Continue working with other member agencies in the East Contra Costa County Habitat Conservation Plan Association (HCPA) to manage and fund the development of a Habitat Conservation Plan (HCP)/Natural Communities

Conservation Plan (NCCP). The Draft HCP has a provision that addresses climate change. The HCPA has identified a 185,000 acre planning area that includes all watersheds draining the eastern flanks of Mount Diablo. Once approved by the regulatory agencies, the HCP/NCCP will establish a funding mechanism to preserve and enhance native habitats which support endangered and sensitive species.

***Additional action(s) to be considered (may be dependent on additional funding):***

- b. The HCPA will also consider including additional environmental regulations in the planning process to enable streamlined permitting and review for endangered species regulations, various wetlands regulations, the California Environmental Quality Act and other laws related to natural resource protection.

## **Cross-jurisdictional Transportation Coordination**

### **107. Traffic Signal Preemption and Flashers**

***Additional action(s) to be considered (may be dependent on additional funding):***

- a. The Public Works and Community Development Departments will continue working with the Contra Costa Transportation Authority (CCTA) and others to address the interaction of transit operators and signal operation including exploring implementation of signal preemption mechanisms to reduce traffic delay for buses while maintaining public safety, especially for pedestrians crossing the intersection.
- b. Changing traffic signals to flash between the hours of midnight and 6 am could save energy used by the lighting fixtures; however this would require that all traffic stop and start, which would likely increase emissions. The County's Traffic Engineer has the authority to change the timing in unincorporated areas, but it must be coordinated so it does not negatively impact traffic in other jurisdictions.

### **108. Alternative Fueled Buses**

***Additional action(s) to be considered (may be dependent on additional funding):***

Encourage local transit agencies to use CNG in their buses, if not already doing so. Even the cleanest diesel bus on the road today releases twice the amount of smog-forming pollutants as a natural gas bus. According to the US Department of Energy, over 10% of our nation's fleet of transit buses and 20% of new buses on order operate on natural gas.

## **Bay Area Air Quality Management District**

### **109. Funding for Local GHG Reduction Measures**

***Additional action(s) to be considered (may be dependent on additional funding):***

Encourage the Bay Area Air Quality Management District (BAAQMD) to dedicate funds to local agencies for implementing voluntary measures to reduce GHG emissions. The BAAQMD receives some settlement funds that can be used for projects that offset air quality violations. The BAAQMD could revise their policy regarding these funds to give priority consideration to local city or county GHG reduction efforts.

**110. Spare the Air**

*Additional action(s) to be considered (may be dependent on additional funding):*

Encourage the BAAQMD to expand the Spare the Air public education campaign to include information about the climate (including highlighting the impacts of climate change and what people can do to help). The Spare the Air campaign has an established message and network of contacts that compliment climate protection.

**111. Green Contracting Ordinance**

*Additional action(s) to be considered (may be dependent on additional funding):*

Encourage the BAAQMD to identify the potential benefits of developing an ordinance similar to one developed by the Sacramento, Yolo, Solano, Placer Air Districts which encourages contractors to procure and operate low emission vehicles (LEVs) and to obtain low-emission fleet status for their off-road equipment and heavy-duty on-road fleets.

**Metropolitan Transportation Commission**

**112. Carpool Requirements on I-680**

*Additional action(s) to be considered (may be dependent on additional funding):*

Encourage the Metropolitan Transportation Commission (MTC) to establish a consistent 2+ carpool occupancy requirement for the entire length of the I-680 corridor after completion of the new span of the Benicia-Martinez Bridge.

# PREPARE FOR CLIMATE CHANGE

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## ADAPTATION STRATEGIES

Climate change is due in large part to the long atmospheric lifetime of GHG emissions (e.g. 100 years for CO<sub>2</sub>). As the science of climate change demonstrates, our planet is already committed to some level of warming. Therefore, it is best to pursue both mitigation measures, like those in the previous chapters, as well as implementing adaptation strategies.<sup>12</sup>

According to the California Energy Commission, scientific research has identified that the below strategies will reduce adverse effects of changing climate, some of which also act as mitigation measures because they either reduce energy consumption or increase carbon sequestration:

- Increasing water conservation (*related measures are included in previous chapters*)
- Recharging groundwater systems by using pavements that are permeable to allow storm water runoff to infiltrate (*related measures are included in previous chapters*)
- Reducing urban heat island impacts by increasing shade coverage and using light-colored roofing and paving materials in urban areas (*related measures are included in previous chapters*)
- Preserving vulnerable habitats, wetlands and areas subject to fires, floods and landslides (*related measure is included in the previous chapter*)
- Creating nature reserves to accommodate future climate changes, range shifts and migrations of plants and animals (*no such measure is included in this report*)

### Public Health Adaptation Strategies

According to the US EPA, climate change is expected to result in worsening air quality, temperature changes, precipitation changes and sea level rise which can contribute to a wide range of potential health impacts. Potential health impacts include: more heat related-deaths and illnesses, aggravation of cardiovascular and respiratory diseases, risk of infectious diseases because of new geographic ranges and activity of disease-carrying vectors/parasites, increased instances of cholera and food poisoning, greater risk of intestinal illnesses or malnutrition due to decreased availability of clean drinking water as well as illnesses, injuries or death caused by storms, floods or substantial population migration/overcrowding.<sup>13</sup>

#### *Patient Education*

Help patients improve health to prepare for climate change and prevent potential health problems associated with climate change. While the big picture of how air pollution and energy choices affect climate change and patients health may not fit in a handy, easy-to-read brochure, tips on how to prevent these effects individually may help reduce hospital visits and medical treatment in the long run.

- Educate patients about climate change and the potential effects it can have on human health.

- Encourage patients to eat more fruits and vegetables. It takes 8.5 times less fossil fuel to produce one calorie of protein from grain compared to meat and the additional vegetation increases carbon sequestration temporarily.
- Encourage patients to adopt active life styles. Physical activity helps improve health, which better prepares patients to adapt to climate change. Furthermore, active patients are more willing and likely to walk or bike to work than inactive patients.

#### *Improve Public Health Infrastructure*

Continue to improve public health infrastructure, by strengthening and maintaining surveillance programs. This is important because the risk of epidemics from insect-borne diseases may increase as the climate warms and changes in precipitation and weather patterns occur.

#### *Prevent Heat-Related Health Problems*

Examine feasibility of installing early warning systems to advise the public and public health officials that dangerously hot weather is coming so that communities can be better prepared. Such a system is in place in Philadelphia, when it predicts a heat wave, officials distribute media advisories, activate telephone hotlines, alert neighborhood volunteers, open air-conditioned shelters, expand outreach to the homeless and coordinate efforts with local utilities to protect vulnerable populations.

# APPENDICES

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## A. LIST OF ACRONYMS USED

AB 939	California's Integrated Waste Management Act of 1989
BAAQMD	Bay Area Air Quality Management District
BMP	Best Management Practice
C.3	Storm Water Runoff Management Requirements
CCP	Cities for Climate Protection
CCTA	Contra Costa Transportation Authority
CEQA	California Environmental Quality Act
CFCs	Chlorofluorocarbons
CH <sub>4</sub>	Methane
CHPS	Collaborative for High Performance Schools
CNG	Compressed Natural Gas
CO <sub>2</sub>	Carbon Dioxide
DDC	Direct Digital Controls
EPA	Environmental Protection Agency
GHG	Greenhouse Gas
GWP	Global Warming Potential
HCP	Habitat Conservation Plan
HCPA	Habitat Conservation Plan Association
HFCs	Hydrofluorocarbons
HVAC	Heating, Ventilation & Air Conditioning
ICLEI	International Council of Local Environmental Initiatives
IPM	Integrated Pest Management
LED	Light-Emitting Diode
LEV	Low Emission Vehicle
MTC	Metropolitan Transportation Commission
N <sub>2</sub> O	Nitrous Oxide
NCCP	Natural Communities Conservation Plan
NEV	Neighborhood Electric Vehicle
PFCs	Perfluorocarbons
PV	Photovoltaic
SEP	Strategic Energy Plan
SF <sub>6</sub>	Sulfur Hexafluoride
RMDZ	Recycling Market Development Zone
RWQCB	Regional Water Quality Control Board
ULL	Urban Limit Line
ZEV	Zero Emission Vehicle

## **B. CITIES FOR CLIMATE PROTECTION CAMPAIGN**

According to their website, the Cities for Climate Protection (CCP) is ICLEI's (International Council of Local Environmental Initiatives) flagship campaign. The program is designed to motivate and empower local governments worldwide to take action on climate change. CCP is a performance-oriented campaign that offers a framework for local governments to reduce greenhouse gas emissions and improve livability within their municipalities.

### **How it works**

Once municipalities make the commitment to participate in the CCP Campaign, ICLEI provides experienced staff, software tools, and a wide variety of programs and technical assistance to help local governments reduce greenhouse gas emissions in an effective, efficient manner.

### **Benefits of Participation**

ICLEI provides local governments that participate in the CCP Campaign with access to the following resources:

- Software products and associated training to assist with the quantification of greenhouse gas reductions and other benefits of climate protection planning.
- Access to a professional network of peers through listservs, newsletters, conferences, and workshops.
- Case studies, fact sheets, policy and practice manuals, toolkits and guides on approaches that other local governments have successfully used to reduce greenhouse gases.
- Training workshops for staff and elected officials on how to develop and implement effective long-term emission reduction strategies.
- Technical assistance in designing and implementing actions to reduce greenhouse gas emissions.
- Notification of relevant grant opportunities.
- Assistance in publicizing local climate protection successes.

In addition, the communities that participate in CCP also benefit from the actions that they take to reduce greenhouse gas emissions through:

- Financial savings in reduced utility and fuel costs to the local government, households, and businesses.
- Improved local air quality, contributing to the general health and well being of the community.
- Economic development and new local jobs as investments in locally produced energy products and services keep money circulating in the local economy.

### **Getting Started**

Local governments begin participating in the CCP Campaign by passing a resolution pledging to reduce greenhouse gas emissions from their municipal operations and throughout their communities. Each local government sets its own emission reduction target and develops a local Climate Action Plan outlining actions that the municipality will pursue to meet its target.

After passing the resolution, the local government designates a staff member and an elected official to serve as the municipality's liaisons to ICLEI. The liaisons then receive welcome

packets from ICLEI that include a detailed Toolkit. This toolkit leads the local government staff person step-by-step through the 5 Milestone process.

### **The 5 Milestones**

The methodology underlying the 5 Milestones of the CCP Campaign provides a simple, standardized means of calculating greenhouse gas emissions, of establishing targets to lower emissions, of reducing greenhouse gas emissions and of monitoring, measuring and reporting performance. ICLEI has developed a software tool that helps municipalities comply with the methodology. The 5 milestones are:

1. *Conduct a baseline emissions inventory and forecast.* Based on energy and waste data, the municipality calculates greenhouse gas emissions for a base year (e.g. 2000) and for a forecast year (e.g. 2015). The inventory and the forecast capture emissions from all municipal operations (e.g. municipally owned and/or operated buildings, streetlights, transit systems, wastewater treatment facilities) and from all community-related activities (e.g. residential and commercial buildings, motor vehicles, waste streams, industry). The inventory and forecast provide a benchmark against which the municipality can measure progress.
2. *Adopt an emissions reduction target for the forecast year.* The municipality passes a resolution establishing an emission reduction target for the municipality. The target is essential both to foster political will and to create a framework to guide the planning and implementation of measures.
3. *Develop a Local Action Plan.* The local government develops a Local Action Plan that describes or lists the policies and measures that the local government will take to reduce greenhouse gas emissions and achieve its emissions reduction target. Most plans include a timeline, a description of financing mechanisms, and an assignment of responsibility to departments and staff. In addition to direct greenhouse gas reduction measures, most plans also incorporate public awareness and education efforts. The development of the Local Action Plan should include strong public input and involvement in order to build the consensus among stakeholders required to implement measures.
4. *Implement policies & measures.* The municipality implements the policies and measures contained in their Local Action Plan. Typical policies and measures implemented by CCP participants include energy efficiency improvements to municipal buildings and water treatment facilities, streetlight retrofits, public transit improvements, installation of renewable power applications, and methane recovery from waste management.
5. *Monitor & verify results.* Monitoring and verifying progress on the implementation of measures to reduce or avoid greenhouse gas emissions is an ongoing process. Monitoring begins once measures are implemented and continues for the life of the measures, providing important feedback that can be use to improve the measures over time. ICLEI's software provides a uniform methodology for municipalities to report on measures.

### **Technical Assistance**

ICLEI provides local governments that participate in the CCP Campaign with a range of technical assistance. Some of the assistance is available for free to participating local

governments and other assistance is available for hire from ICLEI. In general, ICLEI offers assistance in four discrete categories.

- **Inventory Assistance.** ICLEI can assist local governments in conducting their baseline emission inventories and their emission forecasts, helping the municipality understand how and from whom to collect the necessary data. Alternatively, ICLEI can conduct the entire inventory and forecast on behalf of the municipality, presenting the results to local government staff, elected officials and the community as and when requested by the municipality. Local governments that want assistance with conducting their inventory should contact ICLEI.
- **Measures Identification and Quantification Assistance.** ICLEI can assist local governments in identifying potential measures that the municipality can take to reduce greenhouse gas emissions. ICLEI can also help the municipality quantify the emission reductions and other benefits (financial, quality of life) from the full range of possible policies and measures. Local governments that want assistance in identifying measures or quantifying the impact of measures should contact ICLEI.
- **Policy Assistance.** ICLEI provides case studies, fact sheets, agenda reports, sample resolutions, policy frameworks, model ordinance language, and links to key technical information that can assist local governments implement a wide range of measures. Check out the Tools section for more details.
- **Software Assistance.** ICLEI can answer most of questions regarding the use of the CACP software. If ICLEI cannot answer the question, they will refer the municipality to the developer of the software.

### **ICLEI tools**

ICLEI provides a range of tools to help local governments in their efforts to reduce greenhouse gas emissions. We provide toolkits to help local governments identify measures to greenhouse gas emissions as well as educate and engage all sectors of the community in the municipality's climate protection activities. We have developed a state-of-the-art software package to assist local governments and other entities in calculating their greenhouse gas emission. And we have a series of templates for policies and measures that local governments can adopt to improve purchasing policies, etc.

### **CCP resources**

These resources are only available to local governments that are ICLEI members. The primary resource provided by ICLEI to assist local governments participating in the CCP Campaign is the Clean Air and Climate Protection (CACP) software. The CACP software is a user-friendly, Windows-based application that translates data on a community's energy use and solid waste into greenhouse and other air pollutant emissions. The software greatly simplifies the process of inventorying emissions, and it is a great planning tool to calculate the energy, money and emissions savings from measures local governments are considering for inclusion in their action plan. The software:

- Translates energy, fuel use, and other data into greenhouse gas and other pollutant emissions.
- Quantifies the greenhouse gas and other pollutant emissions reductions of existing programs and actions.

- Projects the emissions reductions of potential programs and actions.
- Can be used as a planning tool in choosing measures for the local action plan.
- Can be used to monitor and track the results of actions as they are implemented.
- Calculates co-benefits of emission reduction activities in terms of energy and monetary savings.

In addition to the CACP software, ICLEI provides a wide range of technical assistance to local governments that participate in the CCP Campaign.

## C. REFERENCES

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  - <sup>3</sup> "Towards a Climate Friendly Built Environment", Pew Center on Global Climate Change (June 2005)
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  - <sup>6</sup> "Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks", US EPA (May 2002)
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  - <sup>11</sup> Metro Regional Internal Report (2003), <http://www.metro-region.org/article.cfm?articleid=5568>
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  - <sup>13</sup> "Climate Change and Public Health", US EPA (October 1997)